

Claims

1. A surgical instrument, comprising:
 - an end effector responsive to a longitudinal firing motion to perform a surgical operation;
 - a shaft distally connected to the end effector;
 - 5 a firing member slidably receiving by the shaft to transfer the firing motion to the end effector between an unfired position and a fully fired position; and
 - an anti-backup mechanism comprising:
 - a locking plate including an aperture circumferentially encompassing the firing member, the locking plate pivotal between a locking position wherein the
 - 10 aperture lockingly engages the firing member and an unlocking position wherein the aperture slidably engages the firing member,
 - a locking device responsive to the firing member having traversed from the unfired position toward the fully fired position to tilt the locking plate to the locked position, and
 - 15 a retract mechanism responsive to a retract condition to position the locking plate to the unlock position.
2. The surgical instrument of claim 1, wherein the anti-backup mechanism includes a user control for releasing said locking plate from engagement with said firing member at any point during the longitudinal firing motion.
3. The surgical instrument of claim 1, wherein the retract mechanism is a user control that receives the retract condition is a user control input.
4. The surgical instrument of claim 1, wherein the retract condition is a selected one of a group consisting of the fully fired position of the firing member and a user control input for retraction of the firing member.
5. The surgical instrument of claim 1, wherein the end effector is further responsive to a closure motion, the handle and shaft configured to respectively to generate and to carry the closure motion to the end effector.

6. The surgical instrument of claim 1, wherein said end effector comprises:
an elongate channel connected to said shaft;
an anvil pivotally coupled to said elongate channel for clamping tissue; and
a staple cartridge received in said elongate channel;
- 5 wherein said firing member distally terminates in a firing bar operably configured to
actuate said staple cartridge to form staples in the clamped tissue.
7. The surgical instrument of claim 1, wherein said firing member includes frictional
surface finish to enhance engagement with said locking plate.
8. The surgical instrument of claim 7, wherein said firing member surface finish is
textured.

9. A surgical instrument, comprising:
an end effector responsive to a longitudinal firing motion to perform a surgical operation;
a shaft distally connected to the end effector;
5 a firing member slidably receiving by the shaft to transfer the firing motion to the end effector; and
a handle proximally connected to the shaft and firing member, comprising:
a rack distally coupled to the firing member,
a firing control responsive to an operator to move in a firing direction and a return
10 direction,
a firing mechanism operably configured to couple the firing control to the rack to impart the firing motion in response to the firing direction and to uncouple the firing control from the rack in response to the return direction, and
a locking mechanism operably configured to impede firing member motion in the
15 return direction in response to the firing member having traveled between an initial, unfired position and a fired position.

10. The surgical instrument of claim 9, wherein said end effector comprises a stapling device responsive to the longitudinal firing motion to perform the surgical operation of stapling.

11. The surgical instrument of claim 10, wherein said end effector comprises:
an elongate channel connected to said shaft;
an anvil pivotally coupled to said elongate channel for clamping tissue; and
a staple cartridge received in said elongate channel;
5 wherein said firing member distally terminates in a firing bar operably configured to actuate said staple cartridge to form staples in the clamped tissue.

12. A surgical instrument, comprising:
an end effector responsive to a longitudinal firing motion to perform a surgical operation;
a shaft distally connected to the end effector;
5 a firing member slidably receiving by the shaft to transfer the firing motion to the end effector between an proximal unfired position and a distal fully fired position;
and
an anti-backup mechanism including a locking plate having an aperture
circumferentially encompassing the firing member, the anti backup mechanism
10 biasing the locking plate into locking engagement with the firing member in response to the firing motion and out of locking engagement with the firing member just prior to the fully fired position, said locking engagement allowing distal movement of said firing member and preventing proximal movement of said firing member.
13. The surgical instrument of claim 12, wherein said end effector comprises:
an elongate channel connected to said shaft;
an anvil pivotally coupled to said elongate channel for clamping tissue; and
a staple cartridge received in said elongate channel;
5 wherein said firing member distally terminates in a firing bar operably configured to actuate said staple cartridge to form staples in the clamped tissue.
14. The surgical instrument of claim 12, further comprising a firing mechanism operably configured to transfer sequential firing strokes as a distal longitudinal movement into said firing member.
15. The surgical instrument of claim 14, wherein said firing mechanism comprises a means for traction biased coupling of multiple firing trigger depressions by an operator.
16. The surgical instrument of claim 14, wherein said firing mechanism comprises a means for linked rack coupling of firing trigger depressions by an operator to said firing member.

17. The surgical instrument of claim 16, wherein said firing mechanism further comprises a means for traction biased coupling of multiple firing trigger depressions by an operator.